

## OPERATION MANUAL

# **MODEL 751H HIGH PERFORMANCE ZERO AIR GENERATOR**



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Teledyne Advanced Pollution Instrumentation

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# ABOUT THIS MANUAL

This Model 751H High Performance Zero Air Generator operation manual is comprised of multiple documents as listed below.

<b>Part No.</b>	<b>Rev</b>	<b>Name/Description</b>
07773	A	Model 751H Manual (this manual)
07839	A	Model 751H Spare Parts List (Appendix A of this manual)
078370100	A	Model 751H Interconnect List (Appendix B of this manual)
07837	A	Model 751H Interconnect Diagram (Appendix B of this manual)

## NOTE

Please read this manual in its entirety before making any attempt to operate the instrument.

# REVISION HISTORY

## Model 751H User Manual, PN 07773

<b>Date</b>	<b>Rev</b>	<b>DCN</b>	<b>Description</b>
27 Jan 2014	A	6833	Initial Release



# SAFETY MESSAGES

Important safety messages are provided throughout this manual for the purpose of avoiding personal injury or instrument damage. Please read these messages carefully. Each safety message is associated with a safety alert symbol, and are placed throughout this manual and inside the instrument. The symbols with messages are defined as follows:



**WARNING:** Electrical Shock Hazard



**HAZARD:** Strong oxidizer



**GENERAL WARNING/CAUTION:** Read the accompanying message for specific information.



**CAUTION:** Hot Surface Warning



**Do Not Touch:** Touching some parts of the instrument without protection or proper tools could result in damage to the part(s) and/or the instrument.



**Technician Symbol:** All operations marked with this symbol are to be performed by qualified maintenance personnel only.



**Electrical Ground:** This symbol inside the instrument marks the central safety grounding point for the instrument.

## CAUTION



This instrument should only be used for the purpose and in the manner described in this manual. If you use this instrument in a manner other than that for which it was intended, unpredictable behavior could ensue with possible hazardous consequences.

**NEVER** use any gas analyzer to sample combustible gas(es)!

### Note

**For Technical Assistance regarding the use and maintenance of this instrument or any other Teledyne API product, contact Teledyne API's Technical Support Department:**

**Telephone: 800-324-5190**

**Email: [sda\\_techsupport@teledyne.com](mailto:sda_techsupport@teledyne.com)**

**or access any of the service options on our website at <http://www.teledyne-api.com/>**

# CONSIGNES DE SÉCURITÉ

Des consignes de sécurité importantes sont fournies tout au long du présent manuel dans le but d'éviter des blessures corporelles ou d'endommager les instruments. Veuillez lire attentivement ces consignes. Chaque consigne de sécurité est représentée par un pictogramme d'alerte de sécurité; ces pictogrammes se retrouvent dans ce manuel et à l'intérieur des instruments. Les symboles correspondent aux consignes suivantes :



**AVERTISSEMENT** : Risque de choc électrique



**DANGER** : Oxydant puissant



**AVERTISSEMENT GÉNÉRAL / MISE EN GARDE** : Lire la consigne complémentaire pour des renseignements spécifiques



**MISE EN GARDE** : Surface chaude



**Ne pas toucher** : Toucher à certaines parties de l'instrument sans protection ou sans les outils appropriés pourrait entraîner des dommages aux pièces ou à l'instrument.



**Pictogramme « technicien »** : Toutes les opérations portant ce symbole doivent être effectuées uniquement par du personnel de maintenance qualifié.



**Mise à la terre** : Ce symbole à l'intérieur de l'instrument détermine le point central de la mise à la terre sécuritaire de l'instrument.

## MISE EN GARDE



Cet instrument doit être utilisé aux fins décrites et de la manière décrite dans ce manuel. Si vous utilisez cet instrument d'une autre manière que celle pour laquelle il a été prévu, l'instrument pourrait se comporter de façon imprévisible et entraîner des conséquences dangereuses.

**NE JAMAIS** utiliser un analyseur de gaz pour échantillonner des gaz combustibles!

# WARRANTY

## WARRANTY POLICY (02024G)

Teledyne Advanced Pollution Instrumentation (TAPI), a business unit of Teledyne Instruments, Inc., provides that:

Prior to shipment, TAPI equipment is thoroughly inspected and tested. Should equipment failure occur, TAPI assures its customers that prompt service and support will be available.

## COVERAGE

After the warranty period and throughout the equipment lifetime, TAPI stands ready to provide on-site or in-plant service at reasonable rates similar to those of other manufacturers in the industry. All maintenance and the first level of field troubleshooting are to be performed by the customer.

## NON-TAPI MANUFACTURED EQUIPMENT

Equipment provided but not manufactured by TAPI is warranted and will be repaired to the extent and according to the current terms and conditions of the respective equipment manufacturer's warranty.

## Product Return

All units or components returned to Teledyne API should be properly packed for handling and returned freight prepaid to the nearest designated Service Center. After the repair, the equipment will be returned, freight prepaid.

The complete Terms and Conditions of Sale can be reviewed at [http://www.teledyne-api.com/terms\\_and\\_conditions.asp](http://www.teledyne-api.com/terms_and_conditions.asp)

### CAUTION – Avoid Warranty Invalidation



Failure to comply with proper anti-Electro-Static Discharge (ESD) handling and packing instructions and Return Merchandise Authorization (RMA) procedures when returning parts for repair or calibration may void your warranty. For anti-ESD handling and packing instructions please refer to the manual, Fundamentals of ESD, PN 04786, in its "Packing Components for Return to Teledyne API's Customer Service" section. The manual can be downloaded from our website at <http://www.teledyne-api.com> under Help Center > Product Manuals in the Special Manuals section. RMA procedures are under Help Center > Return Authorization.

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# 1 INTRODUCTION

## 1.1 Preface

The 751H is an excellent source of clean, dry air for dilution calibrators. It also may be used as a source of purge air for permeation tube ovens, zero air for ozone generators, or combustion air for FID analyzers. The 751H has an oil-free and diaphragm-free pump that pushes air through a pre-cooler and water trap that removes moisture, and passes the air through a regenerative, heatless dryer for final drying. The pump then routes the dry air through multiple scrubbers that remove SO<sub>2</sub>, NO, NO<sub>2</sub>, O<sub>3</sub>, H<sub>2</sub>S, CO, and Hydrocarbons; the outlet air passes through a final filter to assure a clean, dry, analytical zero air supply.

The regenerative dryer removes water and produces gas with a dewpoint of less than -20°C (up to 10 SLPM flow rate) independent of the inlet dewpoint, and assists in the removal of other gases, greatly increasing the life of the chemical scrubbers. The 751H is an ideal accessory to the Model T700 Mass Flow Calibrator or Model 702 Single Point Calibrator as a zero air source for analyzers.

## 1.2 751H Features

- Regenerative, heatless dryer for maintenance-free water removal independent of inlet dewpoint
- Long life scrubbers for SO<sub>2</sub>, NO, NO<sub>2</sub>, O<sub>3</sub>, H<sub>2</sub>S, CO, and Hydrocarbons
- Automatic water drain
- May be used to provide combustion air for FID
- Source of purge air for permeation tube ovens
- Source of zero air for Ozone Generators

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## 2 SPECIFICATIONS AND APPROVALS

### 2.1 Specifications

**Table 2-1: Specifications**

Parameter	Specification	
Output	10 SLPM at 30 psig	
Max delivery pressure	30 psig	
Dewpoint	< -20°C	
Dryer	Regenerative heatless dryer with lifetime of greater than 5 years	
Output Concentration	SO <sub>2</sub> <0.025 ppb	
	NO <0.025 ppb	
	NO <sub>2</sub> <0.025 ppb	
	O <sub>3</sub> <0.3 ppb	
	CO < 10 ppb	
	HC < 0.25 ppb	
Compressor	Single-cylinder, internal long-life, oil-less piston pump	
Dimensions	9" x 22" x 13.8" (229 x 559 x 351 mm)	
Weight	47 lbs (21.3 kg)	
Operating Temp	5-40°C	
Power	Typical Power Consumption	
	110-120 V~ 60 Hz, 4.0 A	320 W
	220-240 V~ 50 Hz, 3.0 A	425 W
Environmental Conditions	Installation Category (Over Voltage Category ) II Pollution Degree 2 Intended for Indoor Use Only at Altitudes ≤ 2000m Mains Supply Voltage Fluctuations not to exceed ± 10% of the nominal voltage. Transient Over Voltages according to Over Voltage Category II	

## 2.2 Approvals and Certifications

The Teledyne-API Model 751H Zero Air Generator was designed, tested and certified for Safety and Electromagnetic Compatibility (EMC). This section presents the compliance statements for those requirements and directives. For additional certifications, please contact Technical Support at 1-800-324-5190 or [sda\\_techsupport@teledyne.com](mailto:sda_techsupport@teledyne.com).

### 2.2.1 Safety

IEC/EN 61010-1:2010 (3<sup>rd</sup> Edition), Safety requirements for electrical equipment for measurement, control and laboratory use.

CE: 2006/95/EC, Low-Voltage Directive

### 2.2.2 EMC

IEC/EN 61326-1, Class A Emissions/Industrial Immunity

EN55011 (CISPR 11), Group 1, Class A Emissions

FCC 47 CFR Part 15B, Class A Emissions

CE: 2004/108/EC, Electromagnetic Compatibility Directive

## 3 GETTING STARTED

This section provides instructions on the proper installation and power up of the 751H. Refer to Figure 4-2 for the instrument layout and Table 2-1 for the specifications.

### NOTE

Due to mounting screws through its case, the 751H is not considered waterproof.

### 3.1 Unpacking



#### CAUTION

**TO AVOID PERSONAL INJURY, ALWAYS USE TWO PERSONS TO LIFT AND CARRY THE 751H.**

1. Remove the 751H from its shipping carton.
2. Verify that there is no shipping damage. If there are signs of damage, immediately advise the shipper, then Teledyne API.
3. Open the lid and check for damage inside.
4. Check the line voltage and frequency label on the instrument to ensure that it matches the local power source.

### 3.2 Installation

The basic 751H is a portable, self-contained instrument; there are no installation instructions other than to ensure adequate support for its weight. However, the connections must be made to the instrument panel and drain port with the lid open (see Section 3.4 for connection instructions).



#### CAUTION

**TO AVOID PERSONAL INJURY OR DAMAGE TO THE INSTRUMENT, ALWAYS OPERATE THE 751H WITH THE LID OPEN.**

### 3.3 Instrument Panel

Figure 3-1 shows the components in the Model 751H instrument layout that are pertinent to starting up the instrument.

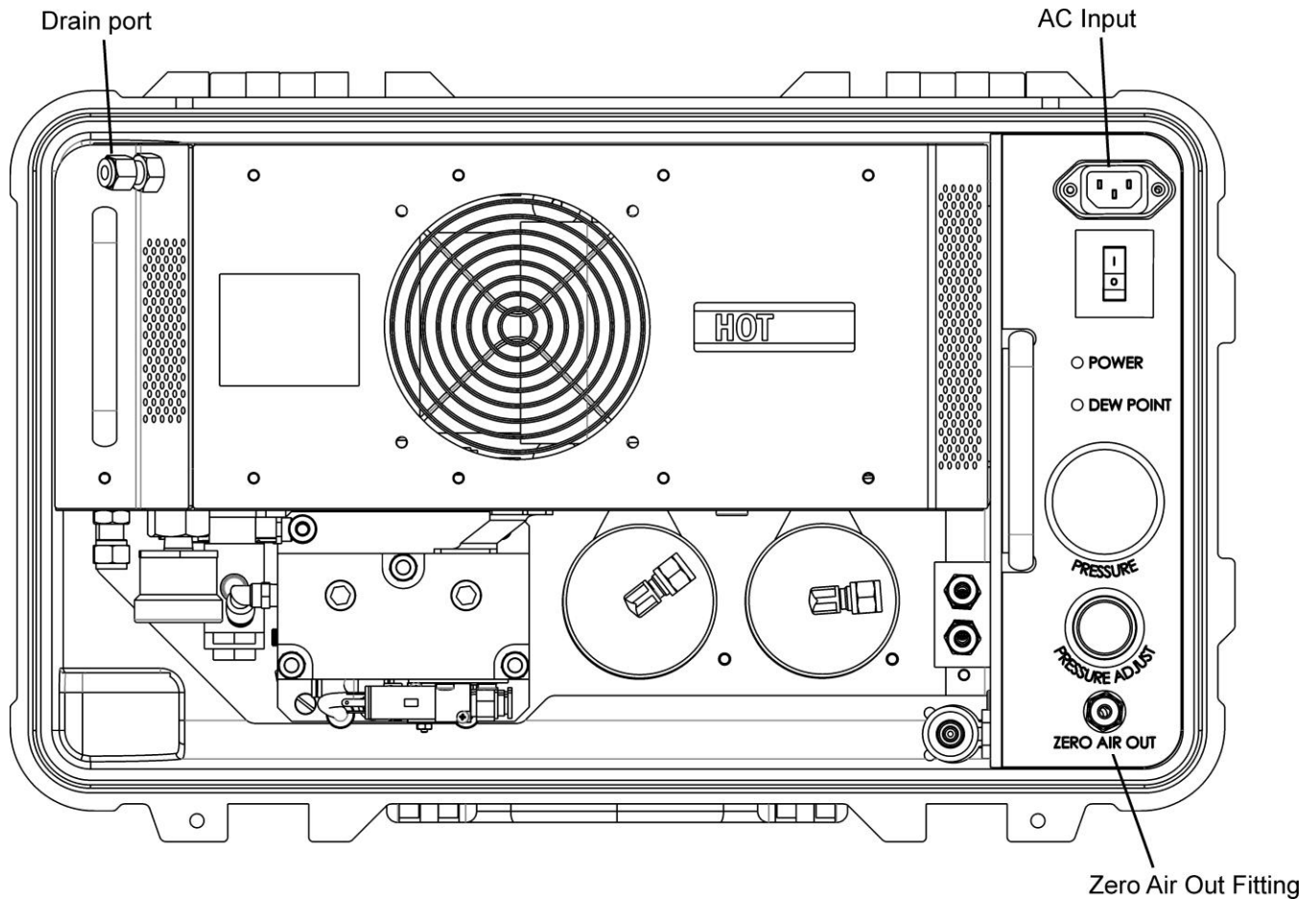


Figure 3-1: 751H Startup Connections



## 3.4 Electrical and Pneumatic Connections

### 3.4.1 ELECTRICAL

#### NOTE

To maintain compliance with EMC standards, it is required that the power cord length be no greater than 3 meters.

With the power switch in the “OFF” position, connect the power cord from the AC input connection to the proper power source.

#### CAUTION



**ENSURE THAT THE POWER CORD IS PROPERLY GROUNDED AND ADEQUATELY RATED FOR THE SPECIFIED POWER RATING OF THIS INSTRUMENT (SEE SPECIFICATIONS TABLE).**

### 3.4.2 PNEUMATICS

Make the following pneumatic connections:

**DRAIN** (1/4” swage-type bulkhead union) - Connect 1/4” diameter tubing to the water-out fitting (refer to Figure 4-2) to avoid the occasional spurts of water ejecting from the fitting. Ensure the tubing is long enough that the water ejects outside the instrument.

**ZERO AIR OUT** (1/4” swage-type bulkhead union) - Connect the AIR OUT port of the 751H to the INLET fitting of the Model 700 Calibrator with *clean* 1/4” TFE tubing. Keep this line as short as possible to minimize pressure drops. . The pressure in this line is adjustable, but should normally be  $30 \pm 5$  psig.

## 3.5 Power-Up

### COOLING FAN Requirements

The instrument panel cooling fan draws air IN and requires at least 6" (150 mm) of clearance for proper operation.

**NOTE:**

**DO NOT BLOCK THE COOLING FAN; ALWAYS KEEP LID OPEN WHEN INSTRUMENT IS RUNNING.**

1. Turn on the instrument panel POWER SWITCH (Figure 3-1).
2. The instrument panel POWER LED should come on.
3. The cooling fan should start immediately.
4. The compressor should start after a few seconds delay. The delay is to allow the control board to measure the local line frequency.
5. After 30 to 60 seconds, the instrument panel pressure gauge should read 30 psig.
6. When the DEWPOINT LED is lit green, it indicates that the 751H is producing clean dry air.

**NOTE**

**If the 751H has been unused for several days, it may take 30-60 minutes for the DEWPOINT LED to light green. However, for ultra-low-level calibrations, running the instrument for several hours could be beneficial for achieving stability and thoroughly scrubbing contaminants.**

## 3.6 Storage and Transportation

If the 751H will not be used for an extended period of time or will be transported, the following procedure applies:

1. Turn off the 751H.
2. Wait approximately 1 minute.
3. Turn on the 751H. The water drain valve will switch into the open position and vent any accumulated water through the water drain. (Standing H<sub>2</sub>O will cause corrosion)
4. Turn the 751H off.

This shut down process will vent any water that has accumulated in the coalescing filter. It will prevent this water from passing into the 751H in the event that the instrument is inverted during storage or shipment.

### **3.7 Expendable Kits (OPT 42A)**

A one-year supply of replacement particulate filters and consumable scrubber media is available from Teledyne API as Option 42A. Refer to Appendix B for a list of expendables.

### **3.8 Flow Restrictor (OPT 72B)**

An external flow restrictor is available in order to run the 751H without a calibrator or other external restriction. It is connected to the outlet fitting and restricts the air flow to 9 SLPM, allowing the 751H to build adequate backpressure to operate.

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# 4 OPERATION

## 4.1 Overview

Refer to Figure 4-1 for a diagram of the 751H pneumatic flow.

The 751H dries and scrubs ambient air to produce zero air. To accomplish this, first the compressor draws air in through the intake filter and compresses it. At the compressor outlet, the air is under pressure and hot from the compression. The relative humidity is high as a result of the high pressure.

The air is conducted through the cooling coil where heat is removed by transfer to the cooling fan air. With the high pressure and the temperature reduced to ambient level, the relative humidity is at its highest. At this point, the air is usually supersaturated.

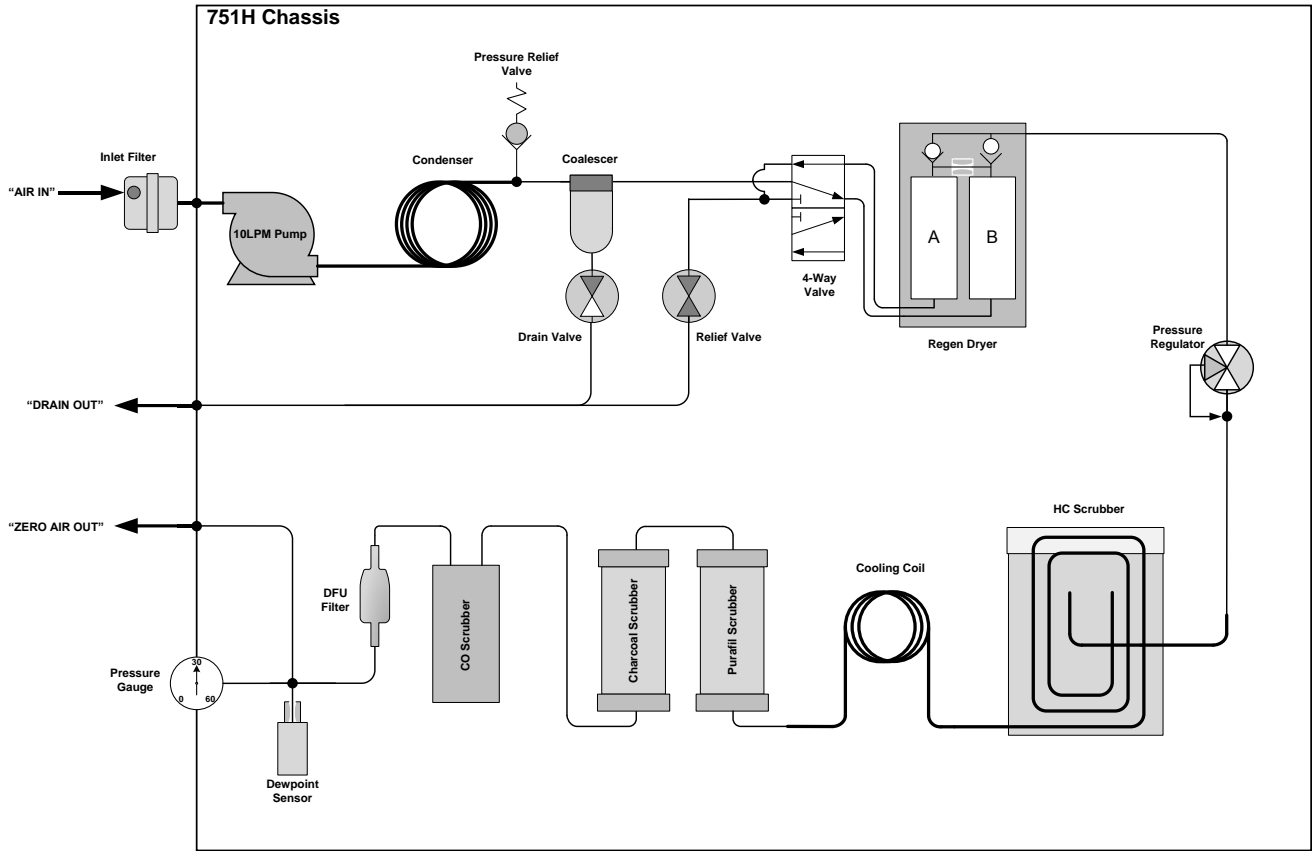
From the coil, the wet air passes through a coalescing filter where the excess water is separated and settles in the bottom of the filter. The controller periodically opens the solenoid drain valve allowing the water to be expelled through a drain fitting.

The partially dried air enters the Regenerative Dryer which removes essentially all the remaining water and a portion of the other contaminants. The pressure relief valve may open occasionally and can be loud but this is a normal part of the operation for the 751H.

As the air leaves the dryer, its pressure is controlled to 30 psig by an air pressure regulator mounted on the instrument panel. This maintains a constant pressure at the calibrator inlet and is displayed by the pressure gauge on the 751H instrument panel.

For a final clean-up, the dry, regulated air enters the specific scrubbers/filters as follows:

1. The Hydrocarbon scrubber where Hydrocarbons are catalytically converted to  $\text{CO}_2$  and water.
2. The NO scrubber where NO is oxidized to  $\text{NO}_2$ .
3. The activated charcoal scrubber where the  $\text{NO}_2$ ,  $\text{O}_3$ ,  $\text{SO}_2$  and  $\text{H}_2\text{S}$  are absorbed.
4. The CO scrubber, where CO is catalytically oxidized to  $\text{CO}_2$ .
5. The clean dry air passes through a fine particulate filter and leaves the 751H through the instrument panel bulkhead union (Zero Air Out).



**Figure 4-1: Pneumatic Diagram**

Figure 4-2 and Figure 4-3 are illustrations of the 751H plan view and a close-up of its instrument panel, respectively.

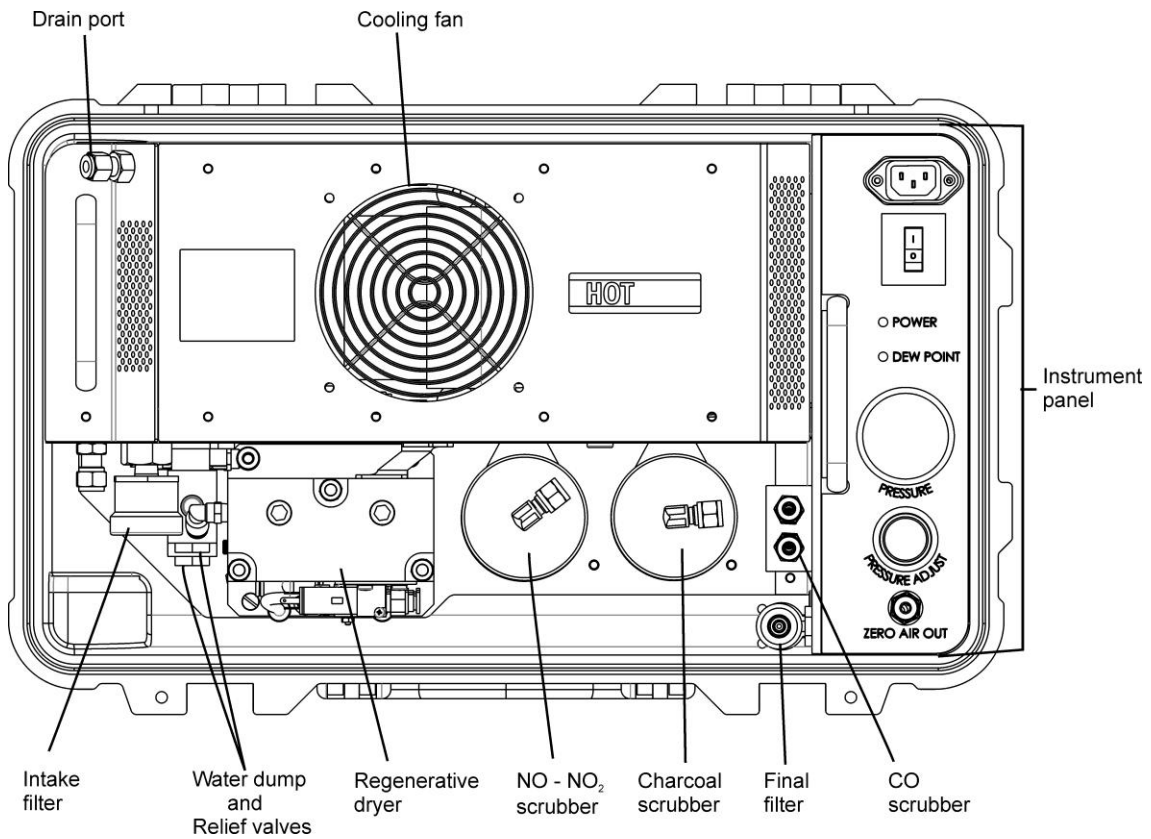


Figure 4-2: Plan View

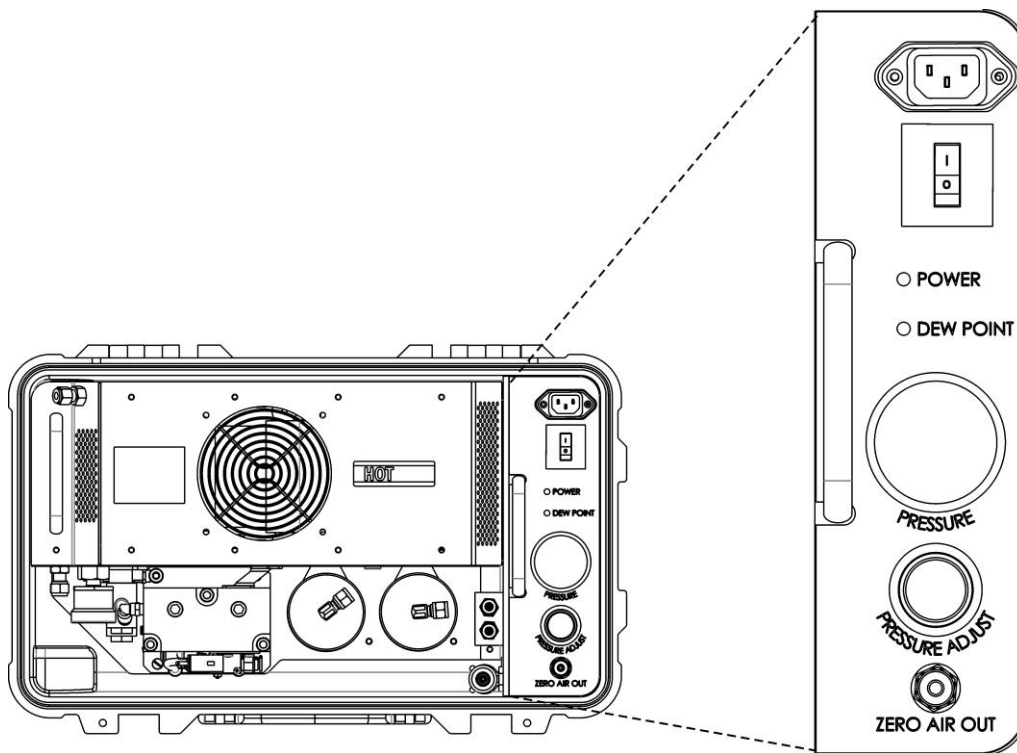


Figure 4-3: Instrument Panel

## 4.2 Components

This section describes the main components and their functions (not all components are visible from the plan view).

### 4.2.1 Intake Filter

The intake filter is a serviceable assembly that houses a screen filter. Maintenance instructions are provided in Section 5 of this manual.

### 4.2.2 Compressor

The compressor is a single-cylinder oscillating piston type driven by a split capacitor AC motor. The compressor is dry; that is, there are no lubricants which can contaminate the compressed air. The pistons are sealed by flexible TFE piston rings, and after a short run-in period to seat the rings, should last for years. There are no diaphragms.

The compressor is mounted on a sub-plate which is supported on four tuned vibration isolators.

### 4.2.3 Cooling Coil

The cooling coil consists of several turns of copper tubing coiled through which the cooling fan blows outside air.

### 4.2.4 Water Trap

The water trap is a coalescing type. Supersaturated air enters the trap and is rapidly swirled causing the water droplets to deposit on a membrane where the drops coalesce and gather in a puddle at the bottom of the filter bowl.

### 4.2.5 Water Drain Valve

The water drain valve is a stainless steel solenoid-operated valve through which accumulated water is drained from the filter. The valve is sequenced by the controller and is pulsed open every minute to remove water from the filter bowl.



#### CAUTION

**THE WATER/AIR SPRAY LEAVING THE DRAIN FITTING SPURTS AT A HIGH VELOCITY AND MUST BE CONDUCTED AWAY FROM ANY SENSITIVE COMPONENTS.**

The operation cycle has been preset at the factory and is not adjustable.



## 4.2.6 Pressure Relief Valve

The pressure relief valve is a safety device designed to limit the maximum pressure to which the 751H can be subjected. It is set to open at 75-80 psig. This can be quite loud when the valve opens and sounds like steam escaping. This is normal operation and does not mean there is a problem with the unit.



### **CAUTION – SAFETY HAZARD**

### **DO NOT ADJUST THE RELIEF VALVE!**

(Contact TAPI Technical Support if there is any concern about proper function).

## 4.2.7 Regenerative Dryer

The Regenerative Dryer consists primarily of two parallel columns of molecular sieve, in which alternately one column is scrubbing the air while the other is being regenerated.

The Regenerative Dryer needs no warm-up and operates at full efficiency as soon as the 751H is turned on. The molecular sieve is not consumed and is good for the life of the instrument.

When the 751H is turned on, a four-way solenoid-operated valve directs high pressure air to one of the two columns and vents the other column to atmosphere. Virtually all the water in the high-pressure air is trapped by the molecular sieve. A portion of the dried air is expanded to atmospheric pressure through a flow controller and passes in reverse through the second column. By expanding the air, the volume increases, thus enabling a small amount of dry purge air to evaporate the entrained water in the second column. The wet purge air leaving the column is routed through a stainless steel solenoid-operated valve and exhausted through the drain fitting. This valve will periodically close when the four-way valve switches columns to maintain system pressure. The majority of the dry air from the first column is conducted on to the pressure regulator.

The controller toggles the four-way valve at a predetermined interval and the columns alternate their function. This cycling rate has been selected to provide the optimum balance of scrubbing efficiency and air usage and is not adjustable.

## 4.2.8 Pressure Sensor

The pressure sensor senses the system pressure directly following the regenerative dryer and controls four-way valve action through the control board.

### 4.2.9 Pressure Regulator

The pressure regulator is set at 30 psig at the factory except for specially modified units. Should adjustment be desired, the regulator is accessible on the instrument panel. The adjustment knob has a push-pull locking ring which should be reengaged after making an adjustment to prevent the knob from turning under vibration.

When the 751H is used with the Teledyne API Model 700 Calibrator, the pressure should be between 28 and 32 psig. The Model 700 calibrator requires that its air source be stable and not subject to compressor-induced pressure surges or pressure variations with flow.



#### WARNING

**THE 751H NOMINAL DELIVERY PRESSURE IS 30 PSIG. NEVER SET THE DELIVERY PRESSURE HIGHER THAN 35 PSIG. TO DO SO MAY CAUSE DAMAGE TO THE 751H AND INJURY TO THE OPERATOR.**

### 4.2.10 Hydrocarbon (HC) Scrubber

The High Purity Hydrocarbon Scrubber catalytically converts hydrocarbons to carbon dioxide and water. The scrubber consists of a cylindrical cartridge which contains a preheat chamber and the pelletized precious-metal catalyst. The cartridge is heated by a band heater with an integral type-K thermocouple and is housed in a stainless steel casing with appropriate thermal insulation. The cartridge temperature is maintained by the instrument's controller. The control board reads the thermocouple voltage, compensates for cold-junction temperature and modulates the heater to maintain a constant cartridge temperature.

The operating temperature of the cartridge is 300°C. The temperature can be verified by measuring the thermocouple voltage at the two terminal blocks of J17 (labeled "HC Scrubber" in Figure 4-4). At 300°C, the thermocouple voltage is 11.2 mV in an ambient temperature of 25°C (11.4 mV at 20° and 11.0 mV at 30°). While the controller compensates for cold-junction temperature in controlling the heater, the thermocouple voltage at the terminal block is not compensated, so allowance must be made for ambient temperature when converting the voltage to cartridge temperature.



#### CAUTION

**THE AIR LEAVING THE SCRUBBER IS AT 300°C (575°F).  
THIS COPPER COIL AND THE CASING CAN BE VERY HOT.**

The catalyst is proprietary. It theoretically should never need changing. However, in the event it were to become contaminated or poisoned, we recommend that the scrubber be replaced.

#### 4.2.11 NO-NO<sub>2</sub> Scrubber

The NO scrubber uses Purafil® to oxidize NO to NO<sub>2</sub>. Purafil® has a finite life and we recommend that it be replaced annually or sooner if the level of NO in the air is high.

#### 4.2.12 Charcoal Scrubber

Activated charcoal removes NO<sub>2</sub>, O<sub>3</sub>, SO<sub>2</sub> and H<sub>2</sub>S. The charcoal should be replaced annually or sooner if there are high atmospheric levels of these contaminants, or if the calibrator zero air shows signs of a positive drift.

#### 4.2.13 Carbon Monoxide (CO) Scrubber

The CO scrubber catalytically oxidizes CO to CO<sub>2</sub>. The catalyst is proprietary and operates at room temperature; theoretically, it should never need changing. However, in the event it were to become contaminated or poisoned, we recommend that the scrubber be replaced.

#### 4.2.14 Final Filter

The final filter, located adjacent to the instrument panel, retains any particulates released by the 751H. The filter rating is 99.99% removal of 0.1 micron particles. If the filter becomes restricted, it should be replaced.

#### 4.2.15 Pressure Gauge

The pressure gauge shows the regulated air pressure available to a calibrator. The gauge will usually indicate 30 psig. If the flow demand from the calibrator changes, the regulator needs to be adjusted to display the correct pressure on the gauge. It is normal for the gauge needle to not rest at zero when the system is not under pressure.

#### 4.2.16 Controller



#### WARNING

**DANGEROUS VOLTAGES EXIST ON THE CONTROLLER BOARD.**

All functions of the 751H are managed by the Control board (Figure 4-4), which provides connections for all switched and non-switched AC components, AC input, and the instrument panel power switch/circuit breaker.

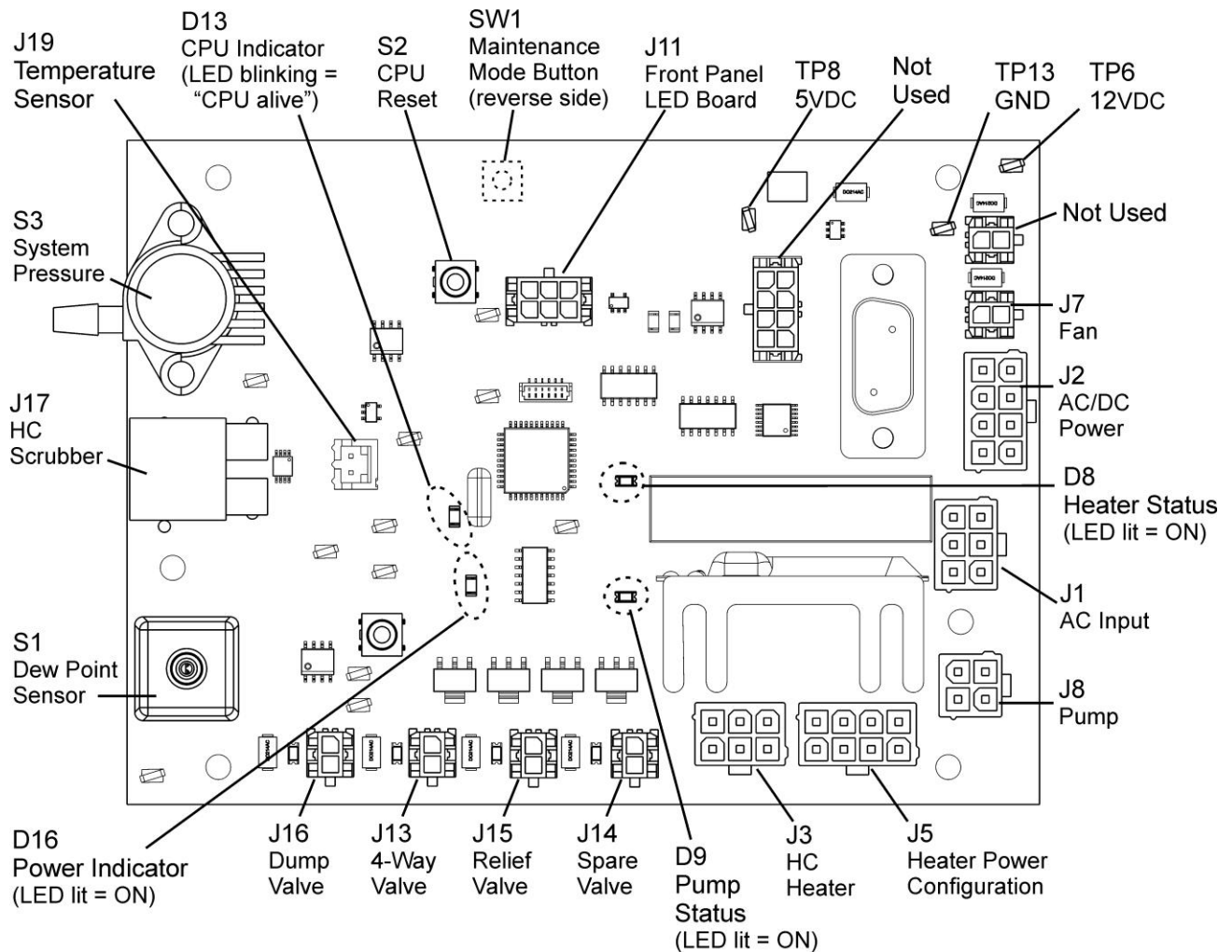
- **Switched** components include the regenerative dryer valve, the water drain valve, and the relief valve.
- **Non-switched** components include the HC scrubber, the fan, the LED board and the pump.

Provision for voltage configuration is via a jumper plug (J5). All electrical connections are made by quick release connectors to aid in servicing. Refer to Figure 4-4 for the layout and to Appendix B for the interconnect and other drawings.

The 751H Control PCB is microcontroller based and provides the following functions:

- Cycles the four-way valve of the Regenerative Dryer.
- Cycles the water drain solenoid valve.
- Cycles the relief valve in response to the pressure sensor.
- Cycles the Regenerative Dryer four-way valve and momentarily opens the water drain solenoid valve at compressor startup. This reduces the pressure at the compressor outlet to facilitate compressor starting.

LED D13 flashes at 1 second intervals as an indication that the controller is functioning, and a watchdog timer is enabled to prevent any power line disturbances from halting the processor.



**Figure 4-4: Control Board Layout**

### 4.2.17 Dewpoint Sensor

The dewpoint sensor ensures that the Regenerative Dryer maintains a dewpoint less than  $-20^{\circ}\text{C}$  (up to the maximum flow rate). This will increase the life of the chemical scrubbers. When the dewpoint drops below  $-20^{\circ}\text{C}$ , the green LED (dewpoint indicator) on the instrument panel will light green, indicating that the air is dry.

### 4.2.18 Instrument Panel Indicator Lights

Multicolor indicator lights for both the power state and dewpoint state relay diagnostic information and instrument mode to the user.

**Table 4-1: Power and Dewpoint Condition Indicators**

Power Indicator	Dew Point Indicator	Instrument State
Green	Green	Power ON, Dewpoint GOOD
Green	Yellow	Power ON, Dewpoint CAUTION
Green	Red	Power ON, Dewpoint BAD
Green	Red-Flashing	Power ON, Dewpoint CRITICAL
Alternating Yellow – Green	Representative of Dewpoint State	Maintenance Mode. 24hr Dewpoint Fault Override
Red-Flashing	Yellow	Temperature Fault.
Red-Flashing	Red	Dew Point Fault.

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# 5 MAINTENANCE

## 5.1 Schedule



### WARNING

There are high voltages present while the 751H is plugged in.



### CAUTION

The operations outlined in this section are to be performed by qualified maintenance personnel only.

Before performing any maintenance, cycle the power on/off and drain any water that may be present (refer to instructions for “Storage and Transportation” in Section 3.6). Table 5-1 presents the maintenance schedule.

**Table 5-1: Maintenance Schedule**

Date Instrument was received: _____		Charcoal Scrubber	NO-NO <sub>2</sub> Scrubber (Purafil)	CO Scrubber	HC Scrubber	Regenerative Dryer	Intake and Final Filters
Recommended Frequency		Annually	Annually	When Contaminated	When Contaminated	When Contaminated	When Contaminated
Refer to Section		5.5	5.6	5.7	5.8	5.9	5.12
Month	January						
	February						
	March						
	April						
	May						
	June						
	July						
	August						
	September						
	October						
	November						
	December						

## 5.2 Maintenance Mode

When changing the media of the Charcoal Scrubber (Section 5.5) and the NO-NO<sub>2</sub> Scrubber (Section 5.6), the new media will contain some moisture due to humidity in the ambient air, consequently triggering a dewpoint fault condition. Placing the 751H in Maintenance Mode will override the fault for 24 hours, allowing time to thoroughly dry the new media before resuming normal operation of the 751H. (In high humidity environments this may take longer).

To activate Maintenance Mode, first follow the instructions for changing the media. At the step when instructed to place the instrument in Maintenance Mode, locate the hole in the bulkhead of the Instrument Panel. This hole is lined up with the Maintenance Mode button on the Control Board (Figure 4-4); pass a blunt instrument with a small diameter through the hole and press the button.

## 5.3 Cleaning

1. Occasionally, depending upon the local conditions, check the inside of the 751H for excessive dirt or dust.
2. Particularly, check the cooling fan, cooling coil and compressor fan inlet.
3. Remove any dirt or dust with a vacuum cleaner.  
Do not use an air jet. This will only redistribute the dirt and will not remove it.

## 5.4 Checking Tubing

1. Under the vibration of the compressor, it is possible for some parts of the TFE tubing to abrade against nearby objects. This is most likely to occur with the tubing directly attached to the compressor.
2. Check to see if any signs of abrasion are present, and, if so, re-dress the tubing.
3. If any section of tubing appears to be heavily abraded, remove and replace it.



### CAUTION

**Do not loosen any tubing connection while the 751H is running.**



### CAUTION

**BEFORE WORKING ON THE 751H PLUMBING TURN OFF THE 751H, WAIT FOR THE PRESSURE GAUGE TO READ ZERO. (THIS MAY REQUIRE THAT YOU LOOSEN THE INSTRUMENT PANEL BULKHEAD UNION TO ALLOW THE AIR TO BLEED AWAY.)**



**WARNING**

**EVEN THOUGH THE INSTRUMENT PANEL POWER SWITCH IS OFF, THERE IS LINE VOLTAGE PRESENT AT THE POWER ENTRY TERMINALS, POWER SWITCH TERMINALS AND ON THE CONTROL BOARD. FOR ADDED SAFETY, REMOVE THE POWER CORD FROM THE INSTRUMENT PANEL RECEPTACLE.**

## 5.5 Replacing the Charcoal Scrubber Media

Before emptying the used charcoal, wearing a dust mask is recommended as a preventive measure since it is possible that some charcoal dust may rise when emptying and refilling the canister.

1. Turn off the 751H and wait for the pressure to go to zero.
2. Remove the 1/4" tubing connected to the top of the scrubber canister.
3. Release the fastening strap to free the canister.
4. Remove the 1/4" tubing connected to the bottom of the canister.
5. Unscrew the cap of the canister.
6. Remove the pad from the top of the canister.
7. Pour out the charcoal and dispose of it properly.
8. Refill the canister with fresh charcoal, up to 3/8" to 1/4" from the top. Rap the sides of the canister gently to settle the charcoal and add more as necessary.
9. Replace the pad on top of the charcoal.
10. Wipe any charcoal dust from the top edge of the canister. This is the surface which seals against the gasket.
11. Check that the gasket is in place in the cap.
12. Replace the cap and tighten it "hand-tight".
13. Reconnect the lower 1/4" tube connection.
14. Reattach the canister with the fastening strap.
15. Reconnect the upper 1/4" tube.
16. Enable "maintenance mode" (Section 5.2) which will bypass the dewpoint warnings during scrubber drying.
17. After the compressor is turned on, it may be wise to check the scrubber for leaks (see Section 5.11).

## 5.6 Replacing the NO - NO<sub>2</sub> Scrubber Media

This procedure is identical to the charcoal scrubber replacement procedure except that the canister should be refilled with Purafil®.

### NOTE

After replacing the material in these scrubbers it can take up to 48 hours for the material to dry out before the 751H is functioning optimally.

## 5.7 Replacing the CO Scrubber

The CO scrubber is attached to the bulkhead adjacent to the instrument panel (Figure 4-2). This is not a heated scrubber. It is secured with four screws through the body of the scrubber into the panel.

1. Turn off power and unplug the 751H.
2. Remove the Charcoal and NO-NO<sub>2</sub> scrubbers to gain access to the hardware.
3. Disconnect the tubing and remove the four screws to remove the scrubber.



### CAUTION

**THE SCRUBBER MAY BE HOT.**

4. With a wrench, remove the two fittings from the top of the scrubber cartridge.
5. Pick out the retaining screens.
6. Shake out the catalyst beads and dispose. No special disposal methods required.
7. Pour in new catalyst to 1/2" from the top of the bores. Tap the cartridge sides gently to settle the beads and top up to the 1/2" level.
8. Return the retainer screens.
9. Replace the TFE tape on the two unions and replace the unions in the cartridge.
10. Reassemble the scrubber and reattach it to the panel.
11. Reconnect the tubing and receptacle.
12. Turn on the 751H and perform a leak check (see Section 5.11).

## 5.8 Replacing the Hydrocarbon (HC) Scrubber

1. Turn off power and unplug the 751H power cord.



### CAUTION

**WAIT FOR THE SCRUBBER TO COOL. THE SCRUBBER CASING AND THE COPPER COOLING COIL WILL BE VERY HOT.**

2. Remove the six screws which secure the chassis to the case.
3. Remove the chassis assembly from the case.
4. Remove the cover, exposing the pump and HC scrubber.
5. Disconnect the HC scrubber power at the Controller.
6. Unplug the thermocouple from the control board.
7. Disconnect the pneumatic connections at the REGULATOR OUTLET AND AT THE COPPER COOLING COIL INLET, using 1/2" and 9/16" wrenches.
5. Loosen the four captive screws holding the scrubber to the chassis.
6. Lift out the scrubber.
7. Install a new Teledyne API-supplied scrubber (these are purged at the factory) and tighten the four captive screws.
8. Attach and tighten the pneumatic connections.



### CAUTION

**ENSURE THAT THE COPPER COOLING COIL DOES NOT TOUCH ANY WIRE OR CABLE.**

9. Reconnect the wiring from the scrubber to the control board.

### CAUTION



**BE SURE THAT YOU USE A TELEDYNE API-SUPPLIED, PURGED SCRUBBER. OTHERWISE, DOWNSTREAM COMPONENTS MAY BE DAMAGED. AN UNPURGED HYDROCARBON SCRUBBER PRODUCES A LOT OF WATER WHEN FIRST TURNED ON.**

11. Plug the thermocouple into the control board.
12. Turn on the 751H.
13. Connect a millivolt meter to J17 (labeled "HC Scrubber" in Figure 4-4) on the temperature controller.  
Observe that the Heater Relay LED (D8) starts blinking at 11.2 mV (300°C) and that the thermocouple voltage holds steady.
14. When all traces of water have disappeared from the 751H output, the output may be reconnected to the analyzer.

## 5.9 Servicing The Regenerative Dryer

It is unlikely that the Regenerative Dryer should ever need service. Should the molecular sieve become contaminated by oil or other external contaminants, the scrubber will need to be cleaned and recharged. Refer to Figure 5-1.

### NOTE

**Wearing a dust mask could be helpful as a preventive measure since the molecular sieve may be dusty.**

1. Turn off the 751H and turn on again and remove any water in bowl.
2. Unplug the instrument from electrical service.
3. Allow the pressure to bleed to zero.
4. Remove the two pneumatic connections and the electrical connection from the 4-way manifold.
5. Remove the dryer from the chassis by undoing the four captive screws in the scrubber base.
6. Remove the 4-way valve bracket from the upper manifold and let the valve hang loose attached to the lower manifold. (If the valve needs to be replaced, see Section 5.10 for procedures).
7. Remove the three nuts on top of the upper manifold.
8. Remove the upper manifold.
9. Remove the two dryer columns from the bottom manifold.
10. Change the four o-rings in the circular grooves in the upper and lower manifolds.
11. Remove the retainer pads from the top end of each dryer column and dump the molecular sieve into a suitable waste receptacle.
12. Remove the retainer pads from the bottom end of each dryer column.
13. Wipe out the inside of the dryer columns with a clean dry cloth.
14. Examine the surface and ports in the upper and lower manifolds. If there is an accumulation of dirt or corrosion, disassemble the manifolds and clean them. If not, proceed with the next step.
15. Place new, clean retainer pad in the bottom end of each dryer column, pushing in until the pads are at the retainer rings.
16. Invert the columns so that the open ends (top) are up.
17. Pour new, clean molecular sieve into each column, up to 1/4" from the top. Rap the side gently, (with a screw-driver handle, for instance) to settle the molecular sieve, and then top up to the 1/4" mark again.
18. Place new, clean retainer pads into the top of each column to the retainer ring.

19. Wipe the ends of the columns. These are the surfaces which seal against the o-rings.
  20. Set the bottom of the columns into the lower manifold. Ensure that they are in the grooves and not caught up on the edge.
  21. Place the upper manifold on top of the two columns. Ensure that the columns are in the grooves. (Wiggle the columns sideways to ensure that the columns are trapped in the grooves.)
  22. Replace the nuts and lock-washers on the three tie rods **BUT DO NOT TIGHTEN THEM.**
  23. Push down hard in the center of the upper manifold with one hand and finger-tighten the nuts until you feel a soft resistance.
  24. With a wrench, tighten each nut in turn, 1/2 turn at a time. This will ensure that all the nuts are tightened evenly. If the nuts are tightened unevenly, the column o-rings may not seal and you may cause damage to the sealing surfaces.
  25. Examine the fit of the columns in the manifold groove one more time.
  26. Re-attach the 4-way valve bracket.
  27. Return the dryer to the 751H chassis and tighten the four captive screws.
  28. Reconnect the two pneumatic fittings and the valve power cord.
  29. Plug in and turn on the 751H.
  30. Check the dryer for leaks (see Section 5.11).
- If no leaks are detected, the 751H is ready for operation.

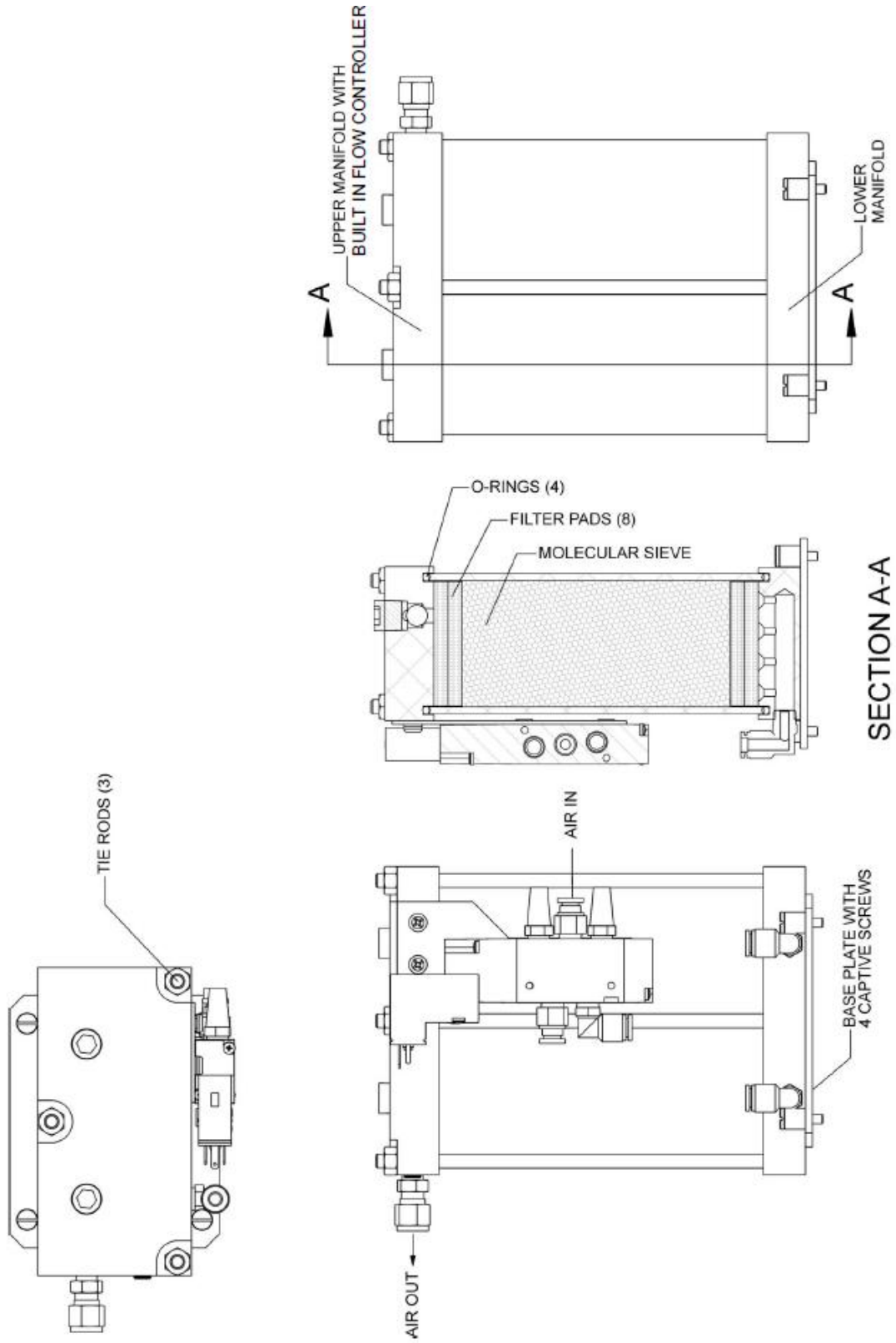


Figure 5-1: Regenerative Dryer

## 5.10 Changing the Regenerative Dryer's 4-Way Valve

1. Remove the Regenerative Dryer from the chassis as described in Section 5.9 above.
2. Disconnect the two tubing connections and the electrical connection to the 4-way valve.
3. Remove the 4-way valve bracket from the regenerative upper manifold.
4. Remove the 4-way valve from the bracket.
5. Attach a new valve, complete with tube fittings and muffler(s).
6. Attach the bracket to the upper manifold.
7. Connect the electric cable and two pneumatic fittings.
8. Re-install the dryer in the 751H chassis and tighten the four captive base screws.

## 5.11 Leak Check



### WARNING

**ENSURE TO UNPLUG THE POWER CORD PRIOR TO PERFORMING ANY LEAK CHECK PROCEDURE**

1. Power off the unit and unplug the power cord.
2. Cap the zero out fitting and the drain port fitting.
3. Disconnect the line to the dewpoint sensor manifold and cap it.
4. Plug in the power cord, power on the unit, and allow it to run for one minute (until it's pressurized).
5. Turn off the power switch and wait five minutes. The reading on the instrument panel pressure gauge should not change.

### NOTE

**This procedure checks the majority of the components and fittings. If you believe that there is still a leak, please contact Technical Support:**

**(858) 657-9800.**

## 5.12 Filter Element Replacement

### 5.12.1 Intake Filter

To service the intake filter (Figure 4-2):

1. Turn the filter cap counter-clockwise and remove from the filter housing.
2. Remove the filter screen and use compressed air to blow out any debris.
3. Reseat the filter screen inside the filter housing.
4. Return the cap to the filter housing and secure in place with a clockwise turn.

If the screen is damaged, then replace the intake filter assembly (TAPI P/N FL51).

### 5.12.2 Final Filter

To replace the disposable Final filter unit (Figure 4-2):

1. Remove the disposable filter unit (DFU) from the retainer clip.
2. Release the tubing at each end of the DFU by pressing the spring-loaded quick-connects toward the DFU and pulling the tubing away.
3. Dispose of the used DFU.
4. Reinsert the tubing into each end of the new DFU (Teledyne API P/N FL50), pushing in tightly to secure.
5. Secure the new filter unit into the retainer clip.



## 6 TROUBLESHOOTING

This section presents possible problems and their causes and solutions.

### CAUTION – Avoid Warranty Invalidation



Failure to comply with proper anti-Electro-Static Discharge (ESD) handling may void your warranty. For anti-ESD handling instructions please refer to the manual, Fundamentals of ESD, PN 04786, which can be downloaded from our website at <http://www.teledyne-api.com> under Help Center > Product Manuals in the Special Manuals section.

**Table 6-1: Troubleshooting**

Problem	Probable Cause	Corrective Action
Power light does not come on.	Unplugged power cord.	Plug in power cord at both ends.
	Incorrect line voltage.	Refer to Table 3-1 for the correct line voltage.
	Tripped power switch/circuit breaker.	Reset power switch/circuit breaker.
Compressor does not start (after 10 seconds).	AIR IN filter is plugged.	Clean or replace the filter.
	Compressor fan is jammed.	Check for any mechanical obstruction.
	Pump is not connected to controller.	Connect the pump to the controller.
	Pump relay (K4) is open.	Replace the controller.
Instrument vibrates excessively.	Compressor shock isolator screws are loose.	Tighten the screws.
	The tubing attached to the compressor is vibrating against a component.	Adjust the placement of the tubing.
Pressure does not increase to 30 psig.	Air demand too high. Maximum air flow is 10 SLPM.	No action. Pressure will increase as flow demand decreases.
	Air Inlet impeded.	Remove the inlet filter and check for impediment or replace filter.
	Pressure regulator is set too low.	Adjust the pressure on the instrument panel. (Please see <b>Warning Note</b> at end of this table).
	Air leakage.	Check for leaks. (Section 5.11).
	Pump has low output pressure.	Rebuild pump (see sticker on pump for rebuild kit PN).

Problem	Probable Cause	Corrective Action
Output pressure surges.	Pressure regulator is set too high and pegged.	Adjust pressure regulator down.
Output air is not "Zero".	Scrubbers may be contaminated.	Replace the scrubbers.
Output air is not dry.	4-way valve is jammed; only one column is being used.	Check to ensure the valve is plugged in; replace the valve.
	Reflux flow controller is plugged.	Replace the upper manifold assembly.
	Molecular sieve is contaminated.	Replace the molecular sieve.

**CAUTION**

**THE 751H NOMINAL DELIVERY PRESSURE IS 30 PSIG.  
NEVER SET THE DELIVERY PRESSURE HIGHER THAN 35 PSIG.  
TO DO SO MAY CAUSE DAMAGE TO THE 751H AND INJURY TO  
THE OPERATOR.**

# APPENDIX A - SPARE PARTS

Note

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Use of replacement parts other than those supplied by TAPI may result in non-compliance with European standard EN 61010-1.

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Note

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Due to the dynamic nature of part numbers, please refer to the Website at <http://www.teledyne-api.com> or call Technical Support at 800-324-5190 for more recent updates to part numbers.

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<b>PART NUMBER</b>	<b>DESCRIPTION</b>
005960000	MEDIA, ACTIVATED CHARCOAL KIT
005970000	MEDIA, PURAFIL KIT
006900000	FELT PADS FOR REGEN DRIER
006900100	FELT PADS FOR SCRUBBER CANISTERS
016920000	MEDIA, MOLECULAR SIEVE KIT
018490000	PRESSURE GAGE
040370000	CO SCRUBBER ASSEMBLY
057270000	GASKET FOR SCRUBBER CANISTERS
077830100	PCA, CONTROL BOARD, 751H
077990000	PUMP ASSY, 115V/60HZ, 751H
077990100	PUMP ASSY, 230V/50HZ, 751H
078580000	ASSY, WATER DROP VALVE 751H
078600000	ASSY, DRYER RELIEF VALVE 751H
078610000	ASSY, 12VDC FAN 751H
FL0000007	FILTER, COALESCING
FL0000050	FILTER, DFU, KYNAR
FL0000051	FILTER, INTAKE, 751H
HW0000439	BULKHEAD SCRUBBER MOUNT
OR0000035	O-RINGS FOR REGEN DRIER
PU0000099	REBUILD KIT, PUMP, 751H

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# APPENDIX B - SCHEMATICS

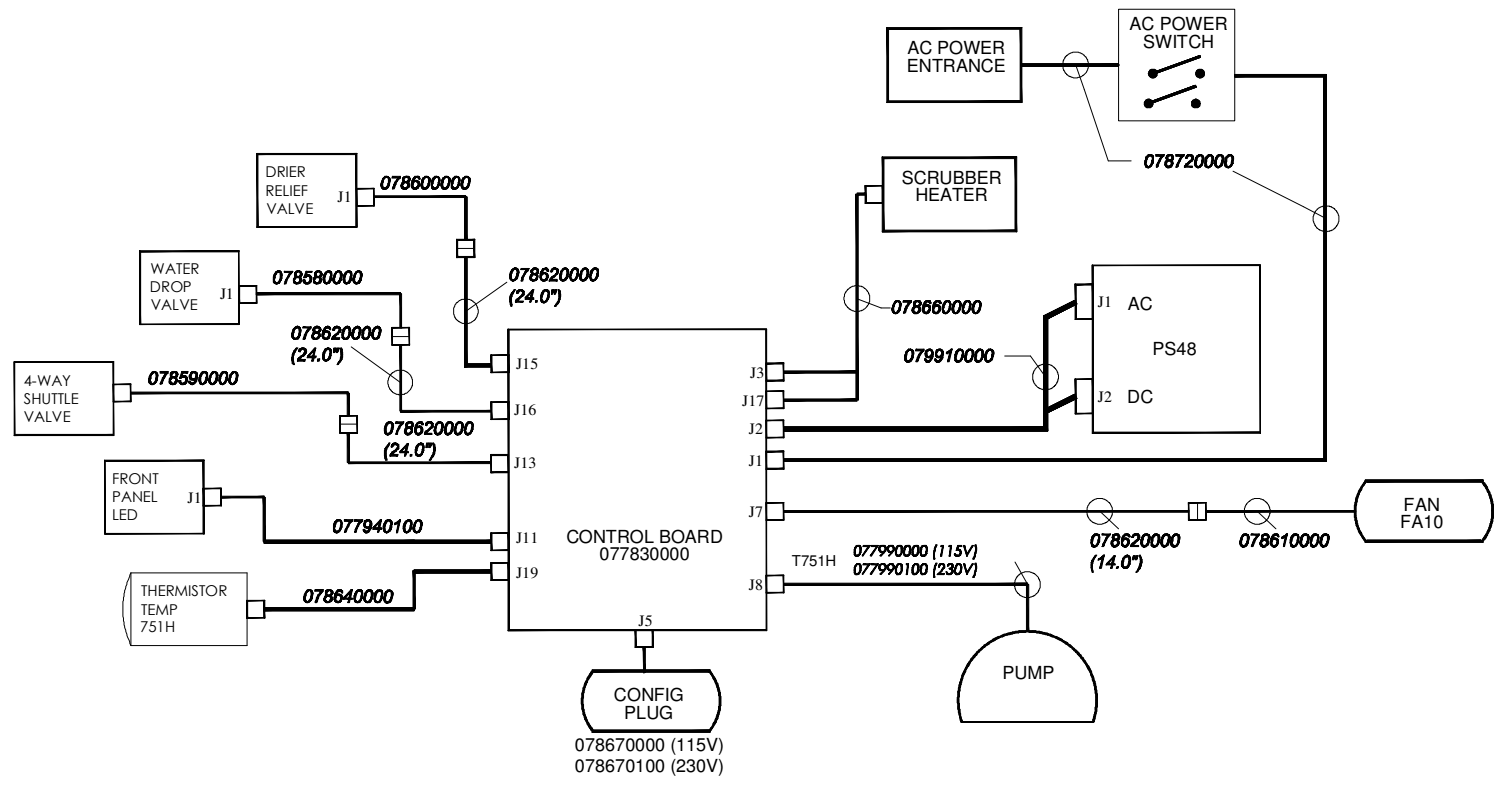
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Revision	Description					Checked	Date	DCN	
A	Production Release					RH	10/6/2013	6768	
CONNECTION FROM									
Cable Part #	Signal	Assembly	PN	J/P	Pin	CONNECTION TO			
						Assembly	PN	J/P	Pin
<b>077940100</b>	<b>Cbl Assy, Front Panel LED Indicator, 751X</b>								
	PWR RED LED	Front Panel LED Board	077890000	J1	1	Control Board	077830000	J11	1
	PWR GREEN LED	Front Panel LED Board	077890000	J1	2	Control Board	077830000	J11	2
	RH RED LED	Front Panel LED Board	077890000	J1	7	Control Board	077830000	J11	3
	GND	Front Panel LED Board	077890000	J1	4	Control Board	077830000	J11	4
	GND	Front Panel LED Board	077890000	J1	3	Control Board	077830000	J11	5
	RH GREEN LED	Front Panel LED Board	077890000	J1	6	Control Board	077830000	J11	6
<b>077990000</b>	<b>Assy, Pump. 115V~, 751H</b>								
	AC Line	Assy, Pump. 115V~	077990000		L	Control Board	077830000	J8	1
	AC Neutral	Assy, Pump. 115V~	077990000		N	Control Board	077830000	J8	2
	Power Gnd	Assy, Pump. 115V~	077990000		G	Control Board	077830000	J8	3
<b>077990100</b>	<b>Assy, Pump. 230V~, 751H</b>								
	AC Line	Assy, Pump. 230V~	077990100		L1	Control Board	077830000	J8	1
	AC Neutral	Assy, Pump. 230V~	077990100		L2	Control Board	077830000	J8	2
	Power Gnd	Assy, Pump. 230V~	077990100		G	Control Board	077830000	J8	3
<b>078580000</b>	<b>Assy, Water Drop Valve, T701X/751X</b>								
	+12V RET	Water Drop Valve	078580000	EXT/J16	1	Control Board	077830000	J16	1
	+12V	Water Drop Valve	078580000	EXT/J16	2	Control Board	077830000	J16	2
<b>078590000</b>	<b>Cbl Assy, 4-Way Shuttle Valve, T701X/751H</b>								
	+12V RET	4-Way Shuttle Valve	078590000	P13	1	Control Board	077830000	J13	1
	+12V	4-Way Shuttle Valve	078590000	P13	2	Control Board	077830000	J13	2

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REVISIONS			
REV	DESCRIPTION	DATE	DCN APPROVED
A	INITIAL RELEASE	8/28/13	6768 TN



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	<p>CONTRACT NA</p>	
	<p>APPROVALS</p>	<p>DATE</p>
	<p>DESIGN TN</p>	<p>4/13</p>
<p>CHECK</p>	<p>CCS</p>	<p>FILE</p>
<p>REVISION</p>	<p>NA</p>	<p>SCALE 1/1</p>
<p>PROJECT</p>	<p>SHRINK TO</p>	<p>SHEET 1 OF 1</p>
<p>THIRD ANGLE PROJECTION</p>	<p>CONTRACT NA</p>	<p>DATE 4/13</p>
<p>DESIGN TN</p>	<p>FILE</p>	<p>1JZF4</p>
<p>CAGE CODE NO.</p>	<p>DWG. NO.</p>	<p>REV</p>
<p>1</p>	<p>07837</p>	<p>A</p>